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Australites from Edjudina Station, Western Australia

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Abstract

Collections of australites from Edjudina Station totalling 1883 specimens have been classified morphologically. The classifiable percentage is 53.5% compared with 49.8% for australites found on Hampton Hill Station 100 km to the south. The low proportion of cores to lens forms (0.49) conforms with the relatively low mean weight of whole australites (2.40 g). The frequency diagram of specific gravity is unimodal in the 2.45 - 2.46 interval and shows no values above 2.47, suggesting that the australites belong to the "normal australite" chemical type.

Introduction

The homestead of Edjudina Station is 134 km north-east of Kalgoorlie, Western Australia at 29°49'S., 122°21'E. (Figure 1). The station is in the semi-arid interior of the State, a region of low relief. Drainage is internal to salt lakes, which are usually dry. The larger lakes are narrow and elongate, occupying the partially choked and modified remnants of old river valleys dating from a time of more humid climate. Many of the australites found in the region lie on the surface of the ground or partially embedded in soil or surficial deposits. Others have been moved towards or into the lake basins by soil creep and ephemeral rain-wash streams. They are found in the dry beds of the streams, on their alluvial fans or along the margins of the lakes. Very occasionally — at intervals of some tens of years — rains are sufficient for lakes to fill, overflow and link up, re-creating parts of the old river system. Water currents can be fast enough to move australites "downstream".

Australites are common in the general vicinity of Edjudina Station. Each of the adjoining or nearby pastoral stations — Yundamindra, Mount Remarkable, Yerilla, Menangina, Gindalbie and Pinjin (Figure 1) — is represented in collections by one hundred to several hundred australite specimens and the region has also yielded an unknown but certainly large number to dealers and lapidaries.

Excluding 7 spurious specimens, 1883 australites from Edjudina Station were examined in the present study. The following collections were represented: South Australian Museum (22), Western Australian Museum (275), Western Australian School of Mines (162), J.L.C. Jones private collection (1424). Small numbers of australites in the private collections of P.J. Simmonds and I.R. Williams were seen but not included in the sample to be considered.

With the exception of six specimens from the northern end of Lake Rebecca and three from Porphyry (Figure 1), no specific locations are known for the australites, an unsatisfactory feature of all the collections. Two of the most likely sources are the known areas of abundance represented by the two small located groups — Lake Rebecca to the

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south-west of Edjudina H.S. and an area immediately east of the small gold-mining centre of Porphyry. A third likely source is the narrow and highly elongated (250 km) Lake Raeside. Australites found in this lake east of Edjudina H.S. are present in the P.J. Simmonds collection. The lake occasionally drains to the south-east with Lake Rebecca as a tributory. Australites have been found in some abundance in or near the lake "upstream", for example in the Mount Remarkable — Yerilla area (nearly 3000 known to have been collected) and near Gwalia (about 250 in various collections).

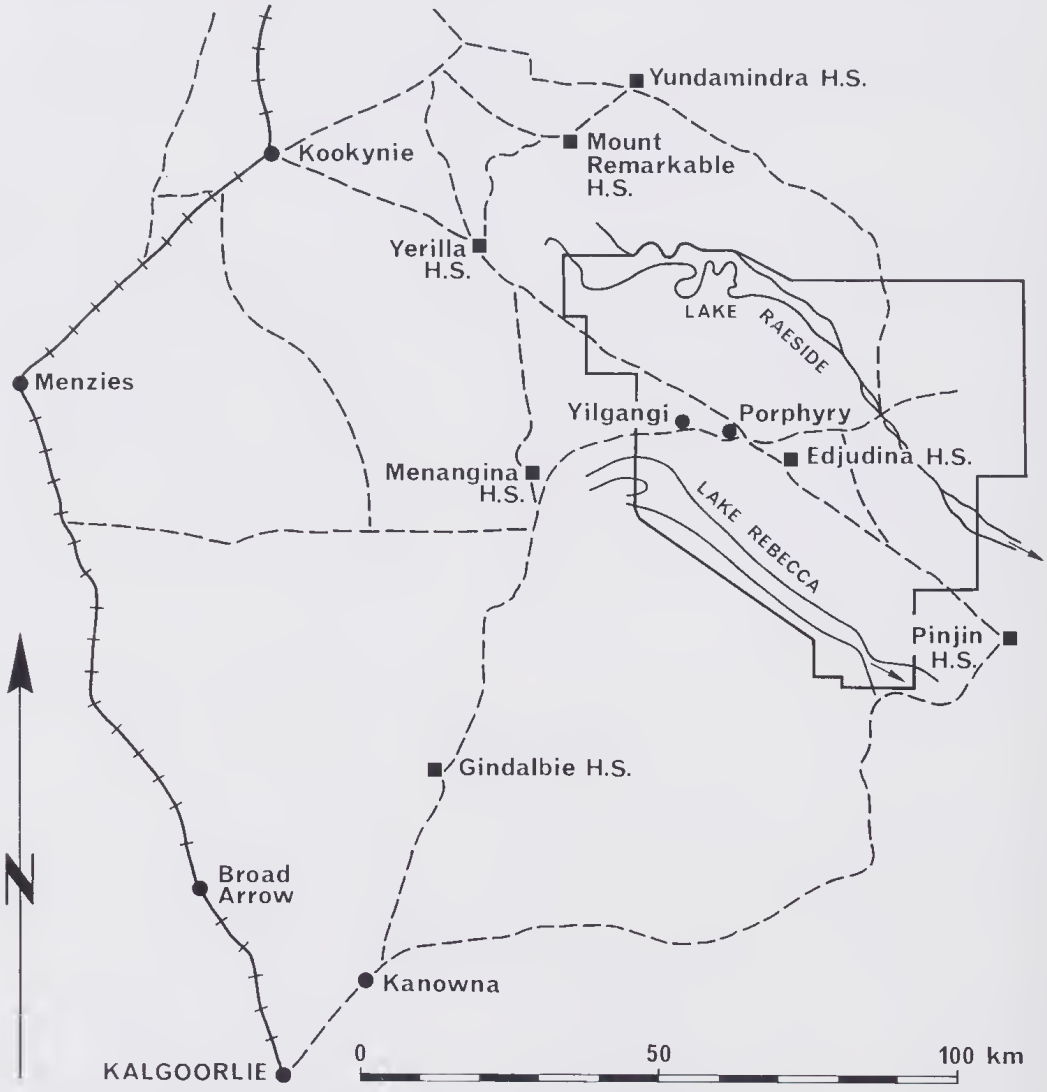

Figure 1 Map of country north-east of Kalgoorlie, Western Australia, showing boundary of Edjudina Station (firm line), head stations (H.S.) of some adjoining and nearby pastoral properties, and relevant parts of Lakes Raeside and Rebecca.

Morphology

The classification of the 1883 australites from Edjudina Station studied in this work (Table 1) follows the system of Cleverly (1986). Extracts from Table 1 are compared in Table 2 with the figures for Hampton Hill Station, about 100 km to the south.

The classifiable percentages of australites (item 3, Table 2) are 53.5% for the sample from Edjudina Station and 49.8% for that from Hampton Hill Station. These figures suggest that weathering and erosion processes have been rather less severe at Edjudina Station.

The percentages of the plan view shapes, adjusted according to the method of Cleverly (1986: 88), are set out for samples found on Edjudina and Hampton Hill Stations in items 6-12 of Table 2. The percentages do not differ greatly between the two samples provided that the total percentages of round and broad oval shapes (item 8, Table 2) are

Table 1 Shape classification and weights of australites from Edjudina Station, Western Australia.

	Numbers of specimens			Weights of whole specimens (g)		
	Whole	Broken	Total	Lightest	Heaviest	Mean
Button	—	1	1	—	—	—
Round Bowl	1	1	2	0.54	—	—
Round indicator I	12	1	13	0.38	4.04	2.22
Lens	354	73	427	0.23	3.48	1.20
Round indicator II	4	—	4	0.85	3.89	2.25
Round core	101	19	120	1.13	16.73	4.72
Broad oval lens	32	5	37	0.42	3.39	1.52
Broad oval indicator II	1	—	1	2.21	—	—
Broad oval core	19	1	20	2.48	19.96	5.69
Narrow oval canoe	—	1	1	—	—	—
Narrow oval lens	44	21	65	0.37	8.57	2.05
Narrow oval indicator II	1	—	1	1.62	—	—
Narrow oval core	19	3	22	1.40	10.22	4.15
Boat-lens	23	8	31	0.69	6.05	1.92
Boat-indicator II	2	—	2	4.62	5.59	5.10
Boat-core	7	—	7	3.04	12.92	7.87
Dumbbell-lens	28	28	56	0.58	5.59	2.19
Dumbbell-indicator II	—	2	2	—	—	—
Dumbbell-core	7	4	11	3.33	16.25	6.36
Teardrop-lens	17	—	17	0.30	4.17	1.66
Teardrop-core	3	1	4	2.32	13.40	6.27
Conical core	122	6	128	0.67	14.41	2.93
Aberrant forms	27	8	35	0.66	5.24	3.26
	824	183	1007	Overall mean: 2.40 g		
Unclassifiable, mostly fragments			809			
Flakes and flaked cores*			67			
			1883			

used in the comparison, personal judgement being involved in distinguishing between those two shapes.

The percentages of australites which have reached the stable core form or relatively stable lens form (totals of items 15 and 17, Table 2) are rather similar — 97.2% for the Edjudina sample, 98.6% for that from Hampton Hill. However, the core/lens-forms ratios are quite different — 0.49 and 0.84 respectively. In general, australite primary bodies up to 30 or 35 mm thick are "lens-forming" and thicker bodies are "core-forming" (Cleverly 1988: 44). The core/lens-forms ratio therefore suggest that the mean weight of whole australites in the Edjudina sample will be relatively small.

The mean weights are 2.40 g and 3.08 g respectively for australites from Edjudina and Hampton Hill Stations (item 20, Table 2). Australites found on Edjudina Station are generally small. The only specimen known to weigh more than 20 g is a round core from near the Out Station c. 30 km north-west of Edjudina H.S. weighing 92.6 g (collection of I.R. Williams).

Table 2 Comparison between morphological features and mean weights of australites from 1. Edjudina Station (this paper) and 2. Hampton Hill Station (Cleverly 1986).

1.	Complete forms or essentially so %	43.8	36.5
2.	Incomplete but classifiable %	9.7	13.3
3.	Total classifiable %	53.5	49.8
4.	Unclassifiable, mostly fragments %	43.0	49.1
5.	Flakes and flaked cores %	3.5	1.1
6.	Round forms %	70.3	66.0
7.	Broad oval forms %	7.2	9.8
8.	Total round and broad oval forms %	77.5	75.8
9.	Narrow oval forms %	9.2	8.1
10.	Boat forms %	4.1	4.5
11.	Dumbbell forms %	7.1	8.4
12.	Teardop forms %	2.1	3.2
13.	Flanged, disc and plate, bowl and canoe forms %	0.4	0.6
14.	Indicators I %	1.4	0.6
15.	Lens forms %	65.1	53.6
16.	Indicators II %	1.0	0.2
17.	Cores including conical %	32.1	45.0
18.	Cores/lens-forms	0.49	0.84
19.	Number of whole australites	824	7993
20.	Mean weight of whole australites (g)	2.40	3.08
21.	Total number of specimens	1883	21 927
22.	Mean weight of all specimens (g)	1.94	1.99

Specific gravity

A frequency diagram of specific gravity for 70 australites from Edjudina Station (Figure 2) resembles that for 59 australites from Gindalbie and Broad Arrow (Chapman *et al.* 1964, Figure 3). The samples have much the same range of values with similar modes and

no values exceeding 2.47. These results suggest that the Edjudina australites belong to the same widespread "normal australite" chemical type (Chapman 1971) as those of Gindalbie and Broad Arrow which are located about 80 km and 120 km respectively to the south-west of Edjudina H.S. (Figure 1).

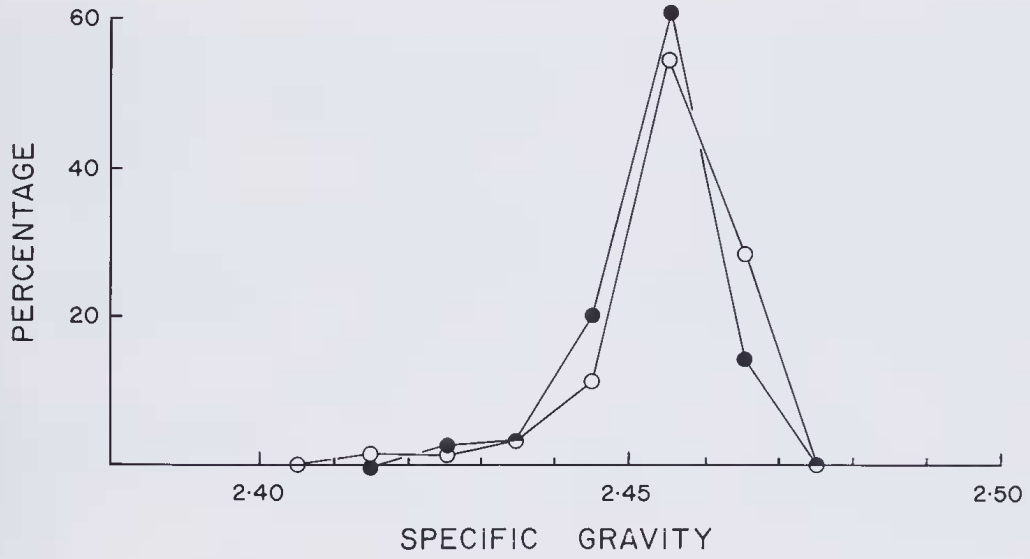

Figure 2 Frequency diagrams of specific gravity. Open circles: sample of 70 australites from Edjudina Station. Filled circles: sample of 59 australites from Gindalbie and Broad Arrow redrawn from Chapman *et al.* (1964 Figure 3).

Individual specimens

Thirteen aberrant specimens have been described previously by Cleverly (1982). The additional specimen shown in Figure 3.0 is one of a limited variety of very rare forms having unexplained shallow concavities or grooves at the ends. If the flight orientation has been shown correctly in the Figure, the shallow grooves are parallel to the line of flight. Most other aberrant specimens from Edjudina Station are abraded examples of the square-ended, canoe-like and seed forms described by Cleverly (1982).

The boat-indicator 11 (Figure 3P) has lost not only the stress shell from the anterior surface but also an outer shell extending up over the posterior surface. It now consists of a central rod and an isolated remnant of outer shell on one end only. Further rare examples of australites with this kind of spalling have been noted from Menangina and Earaheedy Stations (Figures 3V and 3W) and from the vicinity of Kambalda West. These australites may show close checking of the remaining outer surface while spalled areas are peculiarly scalloped. An australite "pebble" spalling spheroidally is also known from Earaheedy Station (Figure 3X) and in that case, at least, sudden heating in grass fires was a possible cause of the peculiarities.

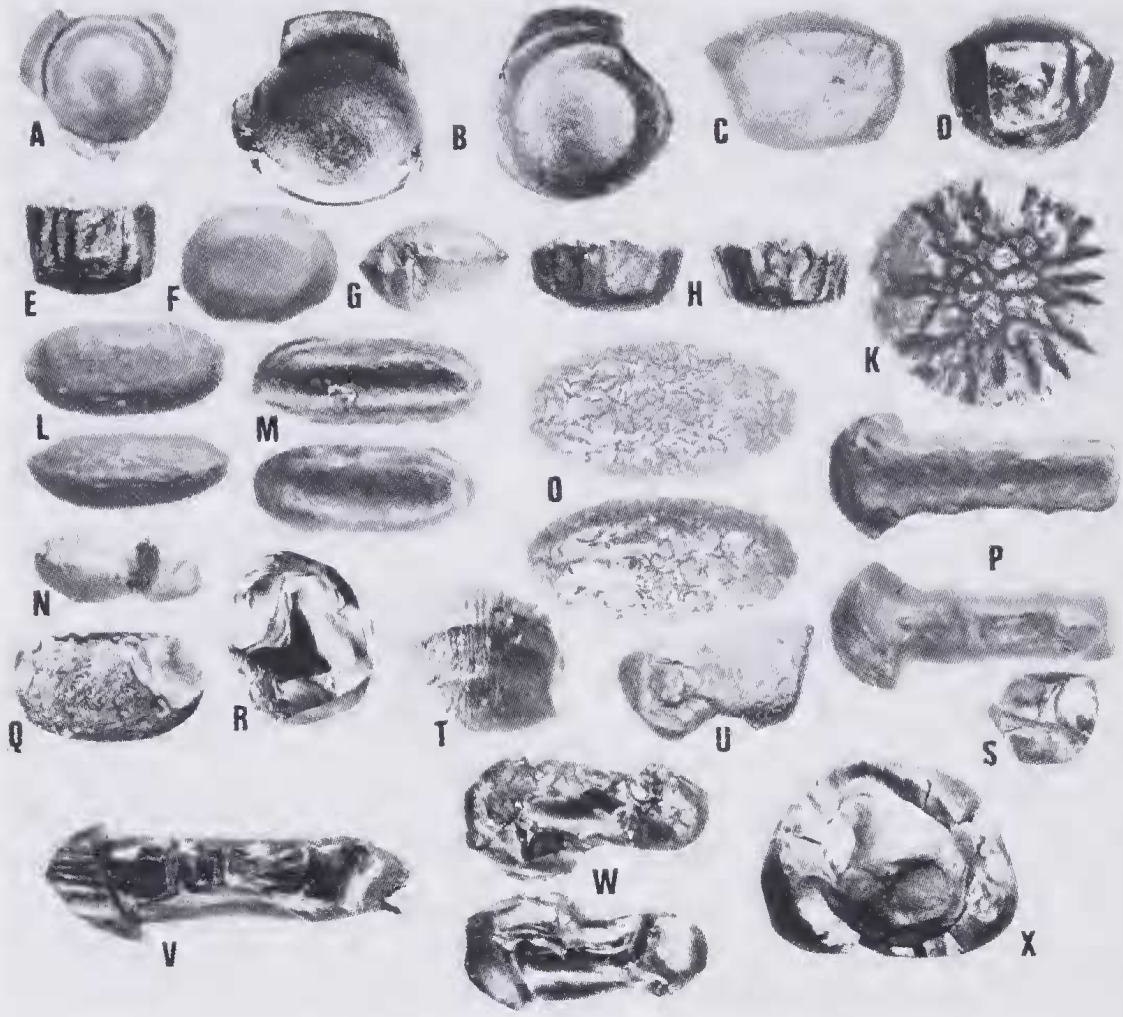

Figure 3 Australites from Edjudina Station (A — U) and elsewhere in Western Australia (V — X), natural size unless otherwise stated. In elevational views, direction of flight is towards bottom of page. A. Round indicator I, posterior surface. B. Round indicator I. At left, as seen obliquely across posterior surface showing the pale "flange band" or "scar"; at right, anterior surface with right-handed helical flow ridge, x 1.5. C. Round indicator II, elevation showing incipient fracture of detachment of remnant of stress shell at upper right, x 1.5. D. Round core, elevation showing angular "flake scars". E. "Small" round core, elevation. F. Broad oval lens, anterior surface with flow ridge. G. Broad oval indicator II, side elevation with remnant of stress shell at left, H. "Small" broad oval core, side elevation at left, end elevation at right. K. Broad oval core, posterior surface with radial V-grooves. L. Boat-lens, perhaps derived from canoe, posterior surface above, side elevation below. M. Boat-lens, posterior surface with short length of butt of flange above, anterior surface with flow ridge below. N. Piece of dumbbell-indicator II, anterior view showing emergent core at left, waist region with attached stress shell at right. O. Aberrant form, supposed posterior surface above with shallowly concave ends, supposed side elevation below. Short grooves over whole surface, x 1.5. P. Part of a boat-indicator II, posterior view above, anterior below, both showing spalling of surface except on

one end. Q. Narrow oval form chipped at one end, a possible artifact. R. Flaked core. S. Worked flake. T. Fragment of stress shell, outer surface showing flow ridges and deeply etched radial flow lines, x 1.5. U. Fragment of elongated indicator II. V. Boat-indicator II from Menangina Station, side elevation showing spalling from both posterior and anterior surfaces, x 1.25. W. Narrow oval indicator II from Earaheedy Station, posterior view above, anterior view below, both showing spalling. X. Australite "pebble" from Earaheedy Station, flight orientation indeterminate, showing spheroidal spalling, x 1.65.

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